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The Contribution of Financial Aid to Undergraduate Persistence

Laura W. Perna
University of Pennsylvania, lperna@gse.upenn.edu

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By Laura Walter Perna

Laura Walter Perna, Ph.D., is a Research Scientist at the Frederick D. Patterson Research Institute in Fairfax, VA.

This paper examines the total, direct, and indirect effects of receiving any financial aid, as well as the amounts, types, and combinations of different types of financial aid received, on persistence to bachelor's degree completion among a subsample from the Beginning Postsecondary Student survey of 1989 freshmen. The analyses show that, although simply receiving financial aid is unrelated to persistence, the effects of financial aid on persistence appear to depend on the type and package of aid received.

More than $55.7 billion in financial aid was awarded by federal, state, and institutional sources to postsecondary education students and their parents in 1996-97, an increase of 70% over the past decade. The emphasis of financial aid programs has been shifting over time from grants to loans. Loans now represent 60% of all aid, up from 50% ten years ago and only 20% twenty years ago (The College Board, 1997). From a public policy perspective, providing a current assessment of the effectiveness of financial aid is warranted, in part, because of these changes.

One of the goals of the student financial aid programs authorized under the Higher Education Act of 1965 is to ensure equal educational opportunity for all academically qualified citizens regardless of their economic status. Equal educational opportunity has been interpreted to include not only access to postsecondary education and choice among postsecondary educational institutions, but also persistence through graduation in the institution selected (Fife, 1975; Hansen, 1983; Scannell, 1992; Fenske & Gregory, 1994). This study provides a current assessment of the effectiveness of financial aid in achieving one aspect of equal educational opportunity, persistence through graduation in the institution selected. Because financial aid is only one factor which influences persistence, this study addresses the following question: What total direct and indirect effects does the receipt of financial aid, and the amount, types, and the nature of the package of aid received, have on persistence to bachelor's degree completion?

Prior Research

Four conclusions may be drawn from a review of previous research that examined the effects of financial aid on persistence. First, prior research does not conclusively reveal the extent to which the effects of financial aid vary based on the types and combinations of aid received. The effects of grants, loans, and work-study on undergraduate persistence are equivocal. Some researchers have shown grant and scholarship aid to be unre-

lated to persistence (Peng & Fetters, 1978; Moline, 1987), while others have concluded from their reviews of prior research (Pantages & Creedon, 1978; Jensen, 1983) and from their own analyses (Astin, 1975) that receiving grants increases persistence. Similarly, although some have concluded from their reviews of prior research (Pantages & Creedon, 1978; Jensen, 1983) and from their own analyses (Peng & Fetters, 1978) that loans are unrelated to persistence, other researchers have found that students who receive loans are less likely to persist (Astin, 1975). Work-study aid (Astin, 1975) and other part-time employment (Astin, 1975; Bers & Smith, 1991) have been shown to increase persistence, but full-time employment (Astin, 1975) and off-campus employment (Astin, 1975; Pascarella & Terenzini, 1991) have been found to decrease persistence rates. The number of hours worked has been shown to both increase (Hall, 1990) and decrease (Peng & Fetters, 1978) the likelihood of persisting.

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Only a few researchers have examined the effects of different combinations or "packages" of financial aid on persistence. In a single institution study, Iwai and Churchill (1982) showed that students who returned for the spring term relied on more sources of financial support (e.g., parental aid, personal savings, summer work, spousal support, part-time work, loans, scholarships) than those who did not return, after controlling for grade point average and class year. Jensen (1984) found that the probability of attaining a bachelor's degree increased when the aid package included grants, loans, and work-study. In contrast, Astin (1975) found that, among freshmen students nationwide in 1968, the effects of any one type of aid generally declined when more than one type of aid was received.

Examinations of the effects of different amounts, types, and packages of financial aid have been limited by the absence of reliable financial aid data. No national student aid database existed prior to 1986-87 when the U.S. Department of Education initiated the first National Postsecondary Student Aid Survey, and no national longitudinal database with reliable financial aid data was available prior to the Beginning Postsecondary Student Longitudinal Study of 1989-90 freshmen students. Consequently, some researchers omitted measures of financial aid from their analyses of persistence or examined students' attitudes about their financial support (e.g., financial security, satisfaction with financial support, certainty of finances, need to work) rather than the effects of the actual aid received (e.g., Bean, 1980; Cabrera, Stampen & Hansen, 1990).

Second, as some (e.g., Stampen & Fenske, 1988; Cabrera, Stampen, & Hansen, 1990) have observed, many studies examining the role of finances on persistence have focused only on the direct effect of financial aid on persistence. But, as several researchers (e.g., Terkla, 1985; Cabrera, Nora, & Castañeda, 1992) have shown through the use of causal modeling tech-

niques, financial aid may also influence persistence indirectly. For example, among a subsample from the National Longitudinal Study of the High School Class of 1972, Terkla found that receiving financial aid had the third largest direct effect and the fifth largest total effect on persistence, after controlling for background characteristics, pre-college academic factors, occupational and educational aspirations, college performance, and institutional characteristics. Cabrera, Nora, and Castañeda (1992) found that, although financial aid was not directly related to persistence among full-time, unmarried, dependent freshmen attending one public commuter institution in 1988, receiving financial aid increased persistence indirectly through cumulative grade point average. Receiving financial aid had the third largest total effect on persisting from the first to the second year, with only intent to persist and cumulative grade point average having larger total effects.

"The influence of financial aid on persistence necessarily reflects the characteristics of the aid programs in place at the time of the study."

Third, most examinations of student persistence have relied on samples drawn from single institutions (e.g., Bergen & Zielke, 1979; Bean, 1980, 1983; McCreight & LeMay, 1982; Jensen, 1984; Moline, 1987; Cabrera, Stampen, & Hansen, 1990). In such circumstances, however, restricted variance in factors such as unmet financial need and family income may produce statistically non-significant relationships regardless of the true relationship. Single institution studies have generally shown that the amount of financial aid received is unrelated to persistence (McCreight & LeMay, 1982; Jensen, 1984; Moline, 1987), likely due to the lack of variance in unmet financial need (McCreight & LeMay, 1982). Among a national sample of 1980 high school seniors, however, the amounts of grants, loans, and work-study received have been found to increase year-to-year persistence after controlling for college grades, institutional characteristics, background characteristics, class year, and other factors.

Finally, the influence of financial aid on persistence necessarily reflects the characteristics of the aid programs in place at the time of the study, particularly in terms of eligibility requirements and the types and amounts of aid available. Continual changes in other social, demographic, and economic factors further limit the relevance of prior research to a particular time period. Because the emphasis of federal financial aid programs has shifted from grants to loans over the past two decades (The College Board, 1997), understanding the current effects of different types of financial aid is particularly important.

This study builds on the strengths and addresses the weaknesses of prior research in several ways. It updates our knowledge of the effects of financial aid using the most recent national longitudinal database with reliable financial aid data that is available: the Beginning Postsecondary Student Longitudinal Study of 1989-90 freshmen. It also examines not only the

effects on persistence of receiving financial aid, but also the effects of the amounts of aid received, the types of aid received, and the combinations or package of aid received. Path analyses are used to explore the extent to which financial aid influences persistence directly, as well as indirectly.

Tinto's Theory of Voluntary Student Departure

The conceptual framework used in this study is a modified version of Tinto's (1975, 1987, 1993) theory of voluntary student departure. According to Tinto, student departure is typically the consequence of various interactions between individual students who have particular background characteristics, attributes, and skills, and other members of the academic and social systems of the institution. Activities that facilitate an individual's academic and social involvement in an institution increase the likelihood of persisting by increasing the individual's commitment to the institution and to the goal of completing college. Unlike economic models, which emphasize the role of finances and financial aid, Tinto's model allows for other explanations for student departure. Tinto's framework also improves on models that are based in organizational sociology by recognizing that the effects of institutional attributes depend on an individual student's intentions and attributes. Some researchers (e.g., Cabrera, Nora, & Castañeda, 1992) have modified Tinto's model to explore the effect of finances on the persistence process.

Research Design

This study uses descriptive and path analyses to examine the effects of financial aid on persistence to bachelor's degree completion by employing a subsample from the most recent available national longitudinal database with reliable financial aid data available, the Beginning Postsecondary Student Longitudinal Study (BPS) of 1989-90 freshmen. For the BPS, 7,253 first-time postsecondary students who participated in the National Postsecondary Student Aid Study in 1990 were followed up in 1992 and 1994. The subsample used in this study includes the 3,188 students with data for persistence who meet the following criteria: initially enrolled in a four-year college or university on a full-time basis, financially dependent, and American citizen. In order to correct for the influence of large sample sizes on standard errors and t-tests, each case is weighted by the sample weight divided by the average weight for the sample. The size of the weighted sample is 796,925 and the size of the adjusted weighted sample used in these analyses is 3,188.

Research Method

Descriptive statistics, such as chi-square and ANOVA, are used to identify the characteristics of students who are and are not persisting to graduation. Path analysis is employed to determine the total, direct, and indirect effects of financial aid on persistence, after controlling for other important factors related to persistence. Because prior research has not adequately mea-

sured the effects on student persistence of different amounts, types, and packages of financial aid and because the amounts, types, and packages of aid available to students have changed over time, the path analyses are repeated using each of five different measures of financial aid. The five specifications are: 1) received financial aid (yes/no); 2) amount of aid received; 3) types of aid received (e.g., loans, grants, and/or work-study); 4) emphasis of the aid package on grants or loans (e.g., grants represent more than 50% of total aid received, loans represent more than 50%, or neither grants nor loans are dominant); and 5) package of aid received (e.g., grants only, grants and loans, or other package of aid).

Variables

The hypothesized predictors of persistence are drawn from the review of prior research and are based on the variables available in the BPS database. In addition to financial aid, the exogenous variables include measures of background characteristics (sex, race, and socioeconomic status), pre-collegiate academic ability, parental encouragement, educational aspirations, institutional commitment, campus experiences, and institutional characteristics. The four endogenous variables in the model are grade point average, academic integration, social integration, and persistence to bachelor's degree completion at the initial institution attended.

Admissions test scores are the only measure of pre-collegiate academic achievement available in the BPS database. But, even after converting available ACT scores to SAT scores, 35% of the cases have no test score data. For students who are missing both SAT and ACT scores, the average SAT/ACT equivalent score for students of the same socioeconomic status quartile and racial group is used.

The only measure of parental encouragement available is parents' highest level of education. The only available proxy for institutional commitment is attending the first-choice institution. Institutional characteristics include selectivity and size. Based on the selectivity rating designated in Barron's *Profiles of American Colleges*, institutions are grouped into one of three categories: very competitive, competitive, and less competitive. Institutional size is measured by total enrollment.

College grades are measured by first-year grade point average, when available, and cumulative grade point average for the entire period attended when first-year grade point average is missing (17% of cases). Factor analysis is used to construct parsimonious measures of academic integration and social integration using existing variables in the database. The academic integration factor includes contact with faculty outside of the classroom, meeting with advisor about academic plans, and talking with faculty about academic matters. The social integration factor comprises participating in school clubs, going

places with friends from school, participating in intramural activities, and participating in study groups with other students. The alpha reliability coefficients are 0.56 for the academic integration factor and 0.55 for the social integration factor. Other variables related to student involvement that are included in the analyses are campus residence, distance from home, and number of hours worked.

Persistence is defined as attainment of the bachelor's degree from the institution in which the student initially enrolled by May 1994, five years after initially enrolling. Students who left their college or university without returning or who transferred to another institution are classified as non-persisters. Although persistence is measured by a dichotomous variable (yes/no), path analysis (and, therefore, ordinary least squares regression) is used in this study. A dichotomous dependent variable is not normally distributed and therefore violates the ordinary least squares (OLS) regression model. Nonetheless, dichotomous dependent variables may be "usefully employed" in OLS regression (Cohen & Cohen, 1983), especially when the split of the dependent variable is approximately 50-50, as in this study. OLS regression is used in this study for two important reasons. First, OLS regression coefficients are easier to interpret than logistic regression coefficients. More importantly for the purposes of this study, path analysis is not possible with logistic regression. Logistic regression analyses (results not shown here) were conducted to confirm the magnitude and direction of the effects of the predictor variables on persistence.

Findings

Descriptive Analyses

Overall, 48% of 1989-90 full-time dependent freshmen completed bachelor's degrees within five years at the institution in which they initially enrolled. Table 1 shows that bachelor's degree completion rates were higher for women than for men (53% versus 44%) and lower for African Americans than for Caucasians (40% versus 49%). Degree completion rates increased with socioeconomic status, rising from 41% for those in the lowest socioeconomic status quartile to 56% for those in the highest quartile, and parental level of education, rising from 36% for students whose parents have not completed high school to 58% for students whose parents have completed advanced degrees. More than one-half (55%) of students who expected to earn more than a bachelor's degree graduated within five years, compared with only 37% of students who expected to end their formal education with a bachelor's degree. Test scores (979 versus 915), college grades (2.85 versus 2.40), academic integration scores (0.07 versus -0.06), and social integration scores (0.16 versus -0.15) were higher for students who completed bachelor's degrees within five years than for students who did not.

TABLE 1
Characteristics of 1989 Freshmen by Completion of Bachelor's Degrees Within Five Years at the Institution in which They Initially Enrolled

Characteristic	Total	Yes (Completed)	No (Did Not Complete)	Statistical Significance
Total	100%	48%	52%	
Adjusted weighted sample	3,188	1,540	1,648	
Sex				$\chi^2 = 25.5$, df = 1, $p < .001$
Male	100%	44%	56%	
Female	100%	53%	47%	
Racial/ethnic group				$\chi^2 = 14.1$, df = 3, $p = .003$
Caucasian	100%	49%	51%	
African American	100%	40%	60%	
Hispanic	100%	44%	56%	
Other	100%	59%	41%	
Socioeconomic status				$\chi^2 = 44.4$, df = 3, $p < .001$
Lowest quartile	100%	41%	59%	
2nd quartile	100%	44%	56%	
3rd quartile	100%	52%	48%	
Highest quartile	100%	56%	44%	
Parents' level of education				$\chi^2 = 57.6$, df = 4, $p < .001$
Less than high school	100%	36%	64%	
High school graduate	100%	39%	61%	
Some postsecondary	100%	47%	53%	
Bachelor's degree	100%	51%	49%	
Advanced degree	100%	58%	42%	
SAT/ACT score	946	979	915	$F = 126.3$, df = 1, 3185, $p < .001$
Educational expectations				$\chi^2 = 90.4$, df = 1, $p < .001$
No more than bachelor's	100%	37%	63%	
More than bachelor's degree	100%	55%	45%	
First-choice institution				$\chi^2 = .30$, df = 1, $p = .58$
No	100%	49%	51%	
Yes	100%	48%	52%	
Reside in campus housing				$\chi^2 = 123.1$, df = 1, $p < .001$
No	100%	33%	67%	
Yes	100%	55%	45%	
Hours worked/week while enrolled				$\chi^2 = 10.8$, df = 4, $p = .029$
Did not work	100%	50%	50%	
1 to 15 hours	100%	53%	47%	
16 to 20 hours	100%	47%	53%	
21 to 34 hours	100%	45%	55%	
35 or more hours	100%	47%	53%	

(Continued on following page.)

TABLE 1
Characteristics of 1989 Freshmen by Completion of Bachelor's Degrees Within Five Years at the Institution in which They Initially Enrolled (cont.)

Characteristic	Total	Yes (Completed)	No (Did Not Complete)	Statistical Significance
Distance from home				$\chi^2 = 61.5$, df = 5, $p < .001$
5 miles or less	100%	32%	68%	
6-10 miles	100%	38%	62%	
11-50 miles	100%	45%	55%	
51-100 miles	100%	53%	47%	
101-500 miles	100%	52%	48%	
Over 500 miles	100%	59%	41%	
Institutional selectivity				$\chi^2 = 140.4$, df = 2, $p < .001$
Very competitive	100%	64%	36%	
Competitive	100%	46%	54%	
Less competitive	100%	36%	64%	
Institutional enrollment	13,393	13,419	13,368	F = .012, df = 1, 3176, p = .90
Grade point average	2.62	2.85	2.40	F = 304.2, df = 1, 3186, $p < .001$
Academic integration	0.00	0.07	-0.06	F = 12.6, df = 1, 3142, $p < .001$
Social integration	0.00	0.16	-0.15	F = 78.2, df = 1, 3142, $p < .001$
Received financial aid				$\chi^2 = 19.1$, df = 1, $p < .001$
No	100%	44%	56%	
Yes	100%	52%	48%	

Bachelor's degree completion rates were also higher for students who received financial aid than for students who did not receive aid (52% versus 44%). Table 2 shows that, on average, students who completed their degrees within five years of initially enrolling received higher amounts of financial aid than students who did not complete their degrees ($5,090 versus $4,235). Among aid recipients, degree completion rates were lower for those who received loans than for those who did not receive loans (48% versus 55%), but higher for those who received work-study than for those who did not receive work-study (59% versus 50%). The highest bachelor's degree completion rates were associated with packages of aid limited to only grants (56%) and packages that comprised grants, loans, and work-study (59%). Bachelor's degree completion rates were higher for aid recipients whose packages of financial aid emphasize grants (54%) than for other aid recipients (48%). In contrast, completion rates were lower for aid recipients whose aid packages emphasized loans (45%) than for other aid recipients (53%).

TABLE 2
Relationship Between the Amount, Type, and Package of Financial Aid Received and Bachelor's Degree Completion Rates Among 1989 Freshmen Who Received Financial Aid

Characteristic	Total	Yes (Completed)	No (Did Not Complete)	Statistical Significance
Average amount of aid				
Overall	4,676	5,090	4,235	$F = 44.1$, df = 1, 3186, $p < .001$
Aid Recipients	2,668	3,105	2,259	$F = 24.8$, df = 1, 1817, $p < .001$
Received loans				$\chi^2 = 8.6$, df = 1, $p = .003$
No	100%	55%	45%	
Yes	100%	48%	52%	
Received grants				$\chi^2 = .10$, df =1, $p = .76$
No	100%	51%	49%	
Yes	100%	52%	48%	
Received work-study				$\chi^2 = 10.6$, df = 1, $p = .001$
No	100%	50%	50%	
Yes	100%	59%	41%	
Package of aid				$\chi^2 = 30.0$, df = 4, $p < .001$
Grants only	100%	56%	44%	
Loans only	100%	48%	52%	
Grants, loans, work	100%	59%	41%	
Grants & loans	100%	42%	58%	
Other	100%	55%	45%	
Grants = more than 50% of all aid				$\chi^2 = 5.7$, df = 1, $p < .05$
No	100%	48%	52%	
Yes	100%	54%	46%	
Loans = more than 50% of all aid				$\chi^2 = 7.4$, df = 1, $p < .01$
No	100%	53%	47%	
Yes	100%	45%	55%	
Neither grants nor loans dominant				$\chi^2 = .08$, df = 1, $p = .77$
No	100%	52%	48%	
Yes	100%	51%	49%	

Path Analyses

Table 3 summarizes the total effects of each of the predictor variables on persistence to bachelor's degree completion. Table 4 shows the direct, indirect, and total effects of financial aid on persistence with each of the five financial aid measurements. Table 3 shows that, regardless of the way financial aid is measured, college grades have the largest total effect on persistence to bachelor's degree completion. Students living on campus, with

TABLE 3
Total Effects of Predictor Variables on Persistence to Bachelor's Degree Completion

Predictor	Any Aid	Rank	Aid Amount	Rank	Type of Aid	Rank	Emphasis on Type	Rank	Aid Package	Rank
Received aid	0.065	8								
Amount of aid			0.058	8						
Received loans					-0.041	13				
Received grants					0.058	9				
Received work					0.037	15				
Grants dominant							0.078	7		
No type dominant							0.034	14		
Loans dominant							0.019	20		
Only grants									0.083	6
Grants, loans, work-study									0.041	15
Grants & loans									-0.002	28
Other package									0.045	12
Grade point average	0.226	1	0.228	1	0.228	1	0.225	1	0.225	1
Reside on campus	0.136	2	0.135	2	0.140	2	0.136	2	0.140	2
Expect more than BA	0.108	3	0.105	3	0.106	3	0.108	3	0.108	3
Test score	0.106	4	0.104	4	0.106	4	0.105	4	0.103	4
Female	0.103	5	0.104	5	0.102	5	0.102	5	0.099	5
Very competitive college	0.082	6	0.077	6	0.080	6	0.079	6	0.083	7
Social integration	0.071	7	0.071	7	0.072	7	0.071	8	0.072	8
Non-competitive college	-0.059	9	-0.056	9	-0.059	8	-0.059	9	-0.060	9
4th SES quartile	0.054	10	0.051	10	0.048	10	0.056	10	0.045	11
3rd SES quartile	0.049	11	0.048	11	0.047	11	0.051	11	0.044	13
Academic integration	0.046	12	0.046	12	0.047	12	0.046	12	0.046	10
Total enrollment	-0.040	13	-0.037	13	-0.041	14	-0.038	13	-0.042	14
11 to 50 miles from home	0.034	14	0.034	14	0.034	17	0.033	16	0.035	16
Other race	0.033	15	0.033	16	0.035	16	0.034	14	0.033	17
Parents' education	0.033	16	0.033	15	0.030	18	0.032	17	0.029	18
Work 1-15 hours	0.021	17	0.019	18	0.013	21	0.021	19	0.017	20
2nd SES quartile	0.020	18	0.021	17	0.022	19	0.022	18	0.018	19
Hispanic	-0.014	19	-0.012	19	-0.014	20	-0.015	21	-0.015	21
First choice institution	0.011	20	0.011	20	0.013	22	0.012	22	0.013	22
African American	-0.010	21	-0.010	21	-0.009		-0.011	23	-0.008	
Work 35 or more hours	0.009		0.008		0.006		0.009		0.008	
Work 16-20 hours	0.009		0.009		0.008		0.010		0.008	
10 miles or less away	0.002		0.002		0.001		0.001		0.003	
Work 21-34 hours	0.002		0.001		0.000		0.002		0.002	

TABLE 4
Direct, Indirect, and Total Effects of Receiving Financial Aid on Persistence to Bachelor's Degree Completion

		Indirect Effects			
Predictor	**Direct Effect**	**College Grades**	**Academic Integration**	**Social Integration**	**Total Effect**
Received any aid	0.032*	0.024	0.005	0.005	0.065
Amount of aid	0.029	0.018	0.006	0.006	0.058
Received loans	-0.023	-0.018	0.001	-0.001	-0.041
Received grants	0.013	0.035	0.004	0.007	0.058
Received work-study	0.040**	-0.004	0.001	-0.001	0.037
Predominantly grants	0.038*	0.030	0.005	0.006	0.078
Predominantly loans	0.011	0.005	0.002	0.000	0.019
No type of aid dominant	0.016	0.013	0.002	0.003	0.034
Only grants	0.040**	0.035	0.003	0.006	0.083
Grant, loan, work	0.036*	-0.002	0.003	0.003	0.041
Grants and loans	-0.018	0.009	0.004	0.004	-0.002
Other package	0.033*	0.009	0.003	0.000	0.045

** $p < .10$, ** $p < .05$*

higher degree goals, with higher admissions test scores, who were female, and who were attending the most selective colleges and universities were also more likely to have earned bachelor's degrees within five years of initial enrollment than other students. The number of hours worked, parents' education, socioeconomic status, attending the first-choice institution, distance from home, and total institutional enrollment were not directly related to persistence regardless of the way in which financial aid was measured.

The total effect of financial aid on persistence was small in magnitude regardless of the way in which financial aid was measured. Table 3 shows that receiving financial aid and the amount of aid received each had the 8th largest total effects on persistence. Table 4 shows that neither receiving financial aid nor the amount of financial aid received influenced persistence directly at the $p < .05$ level. About one-third of the total effects of receiving financial aid and the amount of aid received were exerted indirectly through college grades.

The path analyses suggest that the effect of financial aid on persistence depends on the type and package of financial aid received, and that grants are more effective than loans in pro-

moting persistence. Receiving grants had the 9th largest total effect. When measured as the type of aid received, neither receiving grants nor receiving loans was directly related to persistence. Only receiving work-study had a positive direct effect on persistence. Aid packages composed primarily of grants (i.e., more than 50% of the total amount of aid awarded was in the form of grants) had the 7th largest total effect on persistence. Aid packages limited to grants had the 6th largest total effect. Receiving an aid package comprised of only grants was positively related to persistence directly, as well as indirectly through college grades.

Conclusions and Implications

The BPS is intended to provide national data describing a number of important issues, including access, choice, enrollment, persistence, progress, curriculum, attainment, continuation into graduate or professional school, and rates of return to society. One of the questions the BPS is specifically designed to address is: "How and why do students continue their enrollment in postsecondary education?" (National Center for Education Statistics, 1996, p. 2).

The analyses presented in this paper suggest that the usefulness of the BPS in fully answering this question is limited for at least three reasons. First, the model used in these analyses explains only about 17% of the variance in persistence to degree completion, 14% of the variance in college grades, 19% of the variance in social integration, and 7% of the variance in academic integration. Although the low R^2 for persistence may, in part, be attributable to the use of linear regression with a dichotomous outcome, the high proportion of unexplained variance suggests that the proxies that were used to measure some theoretically important variables were not adequate. For example, only one proxy for initial institutional commitment (attending the first-choice institution) was available even though prior research shows that the most appropriate operationalization of institutional commitment includes a number of elements, such as confidence in the decision to attend the institution, importance of graduating from the institution, practical value of the education to secure employment, feeling of belonging at the institution, and friends' rating of institutional quality (Cabrera, Castañeda, Nora, & Hengstler, 1992). Similarly, parental education was the only available proxy for encouragement of significant others. The absence of statistically significant effects for these variables suggests that these may have been inadequate proxies.

A second limitation pertains to the extent of missing data. About 13% of students who met the other sample selection criteria (financially dependent, U.S. citizens, and initially enrolled full-time in a four-year college or university) were eliminated from the analyses because they were missing persistence data.

One-third of the remaining cases were missing data for admissions test scores and 17% were missing data for first-year college grades. While test score and college grade data were imputed to minimize the effects of missing data, this procedure results in an underestimation of standard errors by 10% to 20% and, as a result, the regression coefficients for these variables may falsely appear to be different from zero.

A third limitation pertains to the adequacy of the composites of academic and social integration. The alpha reliability coefficients for both factors are modest (about 0.55), and may, in part, explain the low percent of variance in academic integration (7%) and social integration (19%) explained by the model. The alpha reliability coefficients represent the extent to which the variables comprising the academic and social integration factors are internally consistent and the extent to which the factor components are measures of the same concept. The modest level of the reliability coefficients suggests that the analyses do not reveal the degree to which financial aid truly influences academic and social integration or the degree to which academic and social integration mediate the effects of financial aid on persistence.

"The effectiveness of financial aid may depend on the type and package of aid received."

Despite these limitations, several conclusions may be drawn. Financial difficulty is commonly reported by students to be a primary reason for leaving an institution (Astin, 1975; Pantages & Creedon, 1978; Wenc, 1983), particularly among first-generation college students (Billson & Terry, 1982). The results of this study suggest, however, that the direct effect of receiving financial aid on bachelor's degree completion is marginal ($p < .10$). Like prior research that generally shows that recipients and non-recipients of financial aid persist at comparable rates (e.g., Bergen & Zielke, 1979; McCreight & LeMay, 1982; Murdock, 1987; Stampen & Cabrera, 1988; Stampen & Fenske, 1988; Pascarella & Terenzini, 1991; Jones & Moss, 1994), the results of this study suggest that financial aid has eliminated the negative effects of inadequate financial resources and provides low-income students with equal opportunity to complete their degrees. As some (Murdock, 1987; Stampen & Cabrera, 1988) have argued, persistence rates of aid recipients and non-recipients will not differ if financial aid reduces the financial reasons for withdrawing among aid recipients, assuming that financial aid is distributed on the basis of financial need.

The results of this study also suggest that the effectiveness of financial aid may depend on the type and package of aid received. Receiving work-study and receiving an aid package that contains only grants both had positive direct effects on persistence ($p < .05$). A comparison of the total effects indicates that grants are more effective in promoting persistence than loans. Like some prior research (e.g., Nora, 1990; Cabrera, Nora, & Castañeda, 1992), the results of this study suggest that fi-

nancial aid influences persistence indirectly through college grades.

Although small in magnitude, the negative total effect of receiving loans on bachelor's degree completion suggests that the shift in the emphasis of federal financial aid programs from grants to loans during the past two decades (The College Board, 1997) may have negatively influenced bachelor's degree completion rates. In other words, the analyses suggest that students who receive loans may be less likely to complete their degrees within five years than their counterparts who do not receive financial aid. The reasons for the negative relationship between loans and degree completion and the positive relationship between grants and degree completion warrant further investigation.

"The results of this study illustrate the importance of considering not only whether students receive financial aid, but also whether they receive various types and combinations of aid."

One possible explanation for the higher degree completion rates of students who receive grants and the lower degree completion rates for students who receive loans pertains to academic performance. Descriptive analyses (not presented here) reveal that students who receive grants have higher college grades than other students and students who receive loans have lower college grades, and the path analyses (Table 3) show that college grades are the strongest predictor of degree completion. Future research should focus on the reasons for these relationships. For example, are grants being awarded to students with greater academic potential and greater likelihood of completing their bachelor's degrees? Are loans being awarded to students with lower academic abilities and higher probabilities of dropping out? Or, does receiving grants increase and receiving loans decrease a student's motivation to succeed academically and progress to degree completion? The answers to such questions have important implications for financial aid offices on individual college and university campuses as well as for policymakers who influence the types of federal financial aid that are made available to undergraduates.

This study also shows that the number of hours worked while enrolled is unrelated to bachelor's degree completion, but that receiving work-study directly contributes to degree completion rates. Future research should explore the types of work undergraduates are performing and the ways in which both work-study and off-campus employment may contribute to persistence. For instance, do students who work manage their time better than other students? Is the type of work in which students are engaged related to students' interest in their academic studies?

The results of this study illustrate the importance of considering not only whether students receive financial aid, but also whether they receive various types and combinations of aid. By focusing future research on how and why different types of financial aid influence undergraduate student persistence,

researchers will have data and information to suggest modifications and innovations to financial aid policies and programs. Such research will ultimately result in more effective use of financial aid dollars in accomplishing a primary goal of federal financial aid programs: persistence through graduation in the institution selected.

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